What is the uncertainty involved?

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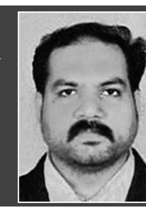
For Feedback...
vijetha.nt@gmail.com

Dr.Krupakar Pendli
Centre Head
Urbane junior colleges
7893774888



Atomic Models & Electromagnetic Radiation

1. Which has highest specific charge?
1) Na^+ (A=23) 2) Mg^{2+} (A=24)
3) Al^{3+} (A=27) 4) Si^{4+} (A=28)

2. α-particles are projected towards the following metals, with the same kinetic energy. Towards which metal, the distance of closest approach is minimum?
1) $Zn(z=30)$ 2) $Cd(Z=48)$
3) $Hg(Z=80)$ 4) $Al(Z=13)$

3. The mass numbers of three isotopes of an element are 11,12,13 units.Thier percentage abundance is 80, 15, and 5 respectively.What is the atomic wieght of the element?
1) 10.25 2) 11.25 3) 12.25 4) 13.25

4. Boron has two istopes B^{10} & B^{11} whose relative abudances are 20% & 80% respectively avg.atomic wieght of Boron is?
1) 10 2) 11 3) 10.5 4) 10.8

5. If the wavelength of green light is about $5000A^0$, then the frequency of its wave is
1) 16×10^{14} sec^{-1} 2) 16×10^{-14} sec^{-1}
3) 6×10^{14} sec^{-1} 4) 6×10^{-14} sec^{-1}

6. The energy of photon of light having frequency of $3\times10^{15}S^{-1}$ is
1) $1.99\times10^{-18}J$ 2) $1.99\times10^{-17}J$
3) $1.99\times10^{-17}ergs$ 4) $1.99\times10^{-18}ergs$

7. What is the energy of photons that corresponds to a wave number of $5\times10^{-5}m^{-1}$
1) $99.384\times10^{-30}J$ 2) $993.84\times10^{-30}J$
3) $9.9384\times10^{-30}J$ 4) $0.99384\times10^{-30}J$

8. Suppose 10^{-17} J of energy is needed by the interior of human eye to see an object. How many photons of green light (λ=550nm) are needed to generate this minimum amount of energy?
1) 14 2) 28 3) 39 4) 42

9. The ratio of the energies of two different radiations whose frequencies are 3×10^{14} Hz and 5×10^{14} Hz is
1) 3 : 5 2) 5 : 3 3) 3 : 1 4) 5 : 1

10. Which one of the following frequency of radiation(in Hz) has a wavelength of 600nm (EAM 2011)
1) 2×10^{13} 2) 5×10^{16} 3) 2×10^{14} 4) 5×10^{14}

Plank's Quantum Theory and Photo Electric Effect

11. In photoelectric effect, the energy of the photon striking a metallic surface is 5.6×10^{-19} J. The kinetic energy of the ejected electrons is 12.0×10^{-20}J. The work function is :
1) $6.4\times10^{-19}J$ 2) $6.8\times10^{-19}J$
3) $4.4\times10^{-19}J$ 4) $6.4\times10^{-20}J$

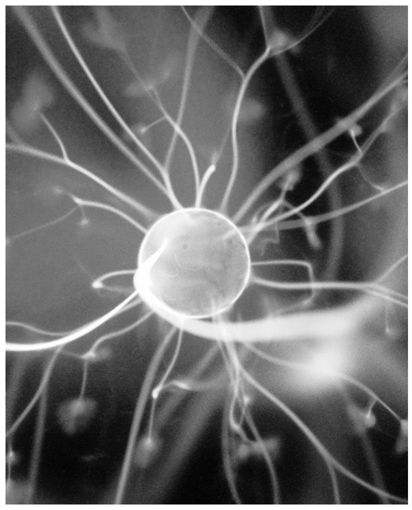
12. An Electro magnetic radiation of wavelength 484nm is just sufficient to ionise a sodium atom.Calculate the ionisation energy of sodium in kJ/mol approximately?
1) 494.5 2) 246.9 3) 989.0 4) 794.5

H-Spectrum

13. Which of the following lines will have a wave no. equal in magnitude to the value of R in the H - Spectral series
1) Limiting line of Balmer series
2) Limiting line of Lyman series
3) First line of Lyman series
4) First line of Balmer series

14. The wave number of first line in Balmer series of Hydrogen is 15,200 cm^{-1} the wave number of first line in Balmer series of Be^{3+}
1) 2.43×10^5cm^{-1} 2) 3.43×10^5cm^{-1}
3) 4.43×10^5cm^{-1} 4) 5.43×10^5cm^{-1}

15. What transition in the hydrogen spectrum would have the same wavelength as the Balmer transition $n=4$ to $n=2$ of He^+ spectrum ?
1) $n_1=1$; $n_2=2$ 2) $n_1=2$, $n_2=3$
3) $n_1=3$, $n_2=2$ 4) $n_1=2$, $n_2=4$



16. The wave number for the longest wavelength transition in the Balmer series of atomic hydrogen is
1) $15.2\times10^6m^{-1}$ 2) $13.6\times10^6m^{-1}$
3) $1.5\times10^6m^{-1}$ 4) $1.3\times10^6m^{-1}$.

17. The ionization potential of hydrogen atom is 13.6 eV. The wavelength of the energy radiation required for the ionization of H-atom
1) 1911 nm 2) 912 nm 3) 68 nm 4) 91.2 nm

18. A gas of mono atomic hydrogen is excited by an energy of 12.75 eV/atom. Which spectral lines of the following are formed in Lyman, Balmer and Paschen series respectively.
1) 3, 2, 1 2) 2, 3, 1 3) 1, 3, 2 4) 1, 2, 3

19. The wave length of the radiation emitted by Hydrogen when compared to He^+ ion is
1) 2 times that of He^+ ion
2) 3 times that of He^+ ion
3) 4 times that of He^+ ion
4) Same as He^+

Bohr's Atomic Model

20. The energy of the second Bohr orbit of hydrogen atom is - 3.41 eV. The energy of the second orbit of He^+ would be
1) – 0.85eV 2) –13.6eV
3) –1.70eV 4) -6.82eV

21. If the diameter of carbon atom is $0.15nm$, the number of carbon atoms which can be placed side by side is a straight line across length of 10.0 cm is
1) 66.66×10^7 2) 66.66×10^8
3) 6.2×10^9 4) 1.33×10^7

22. The ionization energy of the ground state of hydrogen atom is 2.18×10^{-18}J. The energy of an electron in its second orbit would be
1) -1.09×10^{-18}J 2) -2.18×10^{-18}J
3) -4.36×10^{-18}J 4) -5.45×10^{-19}J

23. The velocity of an electron in the first Bohr orbit of hydrogen atom is 2.19×10^6ms^{-1}.Its velocity in the second orbit would be
1) 1.10×10^6ms^{-1} 2) 4.38×10^6ms^{-1}
3) 5.5×10^5ms^{-1} 4) 8.76×10^6ms^{-1}

24. Energy of electron moving in the second orbit of He^+ion is
1) -13.6ev 2) -3.4 ev
3) -1.51 ev 4) -0.84 ev

25. According to Bohr's theory of hydrogen atom
1) There is only fixed set of allowed orbitals for the electron
2) The allowed orbitals of the electrons are elliptical in shape
3) The moment of an electron from one allowed toanother allowed orbital is forbidden
4) No light is emitted as long as the electron remains in an allowed orbital

26. The ratio of radius of 2nd and 3rd Bohr orbit is
1) 3 : 2 2) 9 : 4 3) 2 : 3 4) 4 : 9

27. According to Bohr's theory, which one of the following values of angular momentum of hydrogen atom is not permitted. (EAM-11)
1) $\frac{1.25h}{\pi}$ 2) $\frac{h}{\pi}$ 3) $\frac{1.5h}{\pi}$ 4) $\frac{0.5h}{\pi}$

de-Broglie's and Heisenberg's

28. The mass of the electrons 9.8×10^{-28}gram and uncertainty in the velocity equal to 2×10^{-3}cm/sec. The uncertainty in the position of an electron is ($h=6.62\times10^{-27}$ergsec)
1) $2.9\times10^{+2}$ cm 2) 2.9×10^{-2} cm
3) 2.9×10^{-12} cm^{-1} 4) $2.9\times10^{+12}$ cm^{-1}

29. The velocity of an electron with de Broglie wavelength of 1.0×10^2 nm is :
1) $7.2\times10^5\,cm/sec$ 2) $72\times10^5\,cm/sec$
3) $7.2\times10^4\,cm/sec$ 4) $3.6\times10^5\,cm/sec$

30. The wave length of a electron with mass $9.1\times10^{-31}kg$ and kinetic energy $3.0\times10^{-25}J$ is
1) 89.67nm 2) 8.96nm
3) 456.7nm 4) 896.7nm

31. A cricket ball of 0.5 Kg is moving with a velocity of 100m per sec. the wavelength associated with its motion is
1) 1/100 m 2) 6.6×10^{-34} m
3) 1.32×10^{-35} m 4) 6.6×10^{-28} m

32. A microscope using suitable photons is employed to locate an electron in an atom within a distance of $0.1A^0$. What is the uncertainty involved in the measurement of its velocity?
1) $2.69\times10^6ms^{-1}$ 2) $5.79\times10^5ms^{-1}$
3) $5.79\times10^6ms^{-1}$ 4) $4.62\times10^6ms^{-1}$

JEE MAIN Special

33. The mass of photon with wave length $3.6A^0$ is
1) $6.135\times10^{-33}kg$ 2) $6.135\times10^{-27}kg$
3) $4.126\times10^{-29}kg$ 4) $4.126\times10^{-25}kg$

34. If the velocity of electron in Bohr's first orbit is $2.19\times10^6\,ms^{-1}$. The de-Broglie's wavelength is
1) 332 pm 2) 313 pm 3) 3.32 pm 4) 3.13 pm

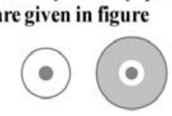
35. Uncertainity in position of a particle of 25 gram in space is 10^{-5}m. Hence uncertainity in velocity (m/sec) is ($h=6.6\times10^{-34}$ J - sec)
1) 2.1×10^{-28} 2) 2.1×10^{-34}
3) 0.5×10^{-34} 4) 5×10^{-24}

36. An electron, a proton and an alpha particle have K.E. of 16E, 4E and E respectively. What is the qualitative order of their de-Broglie wavelengths:
1) $\lambda_e>\lambda_p>\lambda_\alpha$ 2) $\lambda_p=\lambda_\alpha>\lambda_e$
3) $\lambda_p<\lambda_e<\lambda_\alpha$ 4) $\lambda_\alpha<\lambda_e=\lambda_p$

37. The wavelengths of electron waves in two orbits is 3 : 5. The ratio of kinetic energy of electrons will be (EAM 2009)
1) 25:9 2) 5:3 3) 9:25 4) 3:5

Quantum Mechanics & Numbers

38. The probability density plots of 1s and 2s orbitals are given in figure



1s 2s

The density of dots in region represents the probability density of finding electrons in the region.On the basis of above diagram which of the following statements is incorrect?
1) 1s and 2s orbitals are spherical in shape
2) The probability of finding the electron is maximum near the nucleus.
3) The probability of finding the electron at a given distance is equal in all directions.
4) The probability density of electrons for 2s orbitals decreases uniformly as distance from the nucleus increases.

39. The maximum number of electrons with spin value +1/2 in the orbital with azimuthal quantum number value l = 2 and magnetic quantum number m = +2 is.......
1) 5 2) 6 3) 3 4) 1

40. Which one of the following set of quantum numbers is not possible for a 4p electron?
1) n =4, l = 1, m = +1, $m_s=+\frac{1}{2}$
2) n =4, l = 1, m = 0, $m_s=+\frac{1}{2}$
3) n = 4, l = 1, m = 2, $m_s=+\frac{1}{2}$
4) n = 4, l = 1, m = -1, $m_s=+\frac{1}{2}$

41. The total number of electrons present in all the s orbitals, all the P orbitals and all the d orbitals of cesium ion are respectively.
1) 6, 26, 10 2) 10,24,20
3) 8, 22, 24 4) 12, 20, 23

42. The quantum numbers + 1/2 and - 1/2 for the electron spin represent
1) rotation of electron in clockwise and anti clockwise direction respectively
2) rotation of electron in anti-clockwise and clockwise direction respectively
3) magnetic moment of the electron pointing up and down respectively
4) two quantum mechanical spin states which have no classical analogue

43. The correct set of quantum numbers for the unpaired electron of Chlorine atom
1) 2,0,0,+1/2 2) 2,1,-1,+1/2
3) 3,0,0,+1/2 4) 3,1,-1, ± 1/2

44. The quantum number which explain the line spectra observed as doublets in case of hydrogen and alkali metals and doublets & triplets in case of alkaline earth metals is (EAM 2012)
1) Spin 2) Azimuthal 3) Magnetic 4) Principle

Electronic Configurations

45. An element has 2 electrons in K shell, 8 electrons in L shell, 13 electrons in M shell and one electron in N shell. The element is
1) Cr 2) Fe 3) V 4) Ti

46. A compound Vanadium has a magnetic moment of 1.73BM. The electronic configuration of Vanadium ion in the compound is______.
1) $[Ar]3d^2$ 2) $[Ar]3d^1 4s^0$
3) $[Ar]3d^3$ 4) $[Ar]3d^0 4s^1$

47. A transition metal 'X' has a configuration $[Ar]3d^4$ in its +3 oxidation state, its atomic number is
1) 25 2) 26 3) 22 4) 19

48. Which one of the following ions has same number of unpaired electrons as those present in V^{+3} ion. (Eam–2014)
1) Fe^{+3} 2) Ni^{+2} 3) Mn^{+2} 4) Cr^{+3}

KEY

01) 4	02) 4	03) 2	04) 4	05) 3	06) 1
07) 3	08) 2	09) 1	10) 4	11) 3	12) 2
13) 2	14) 1	15) 1	16) 3	17) 4	18) 1
19) 3	20) 2	21) 1	22) 4	23) 1	24) 1
25) 4	26) 4	27) 1	28) 1	29) 1	30) 4
31) 3	32) 3	33) 1	34) 1	35) 1	36) 1
37) 1	38) 4	39) 4	40) 3	41) 2	42) 4
43) 4	44) 1	45) 1	46) 2	47) 1	48) 2